

WHAT IS CLAIMED IS:

- 1 1. A primary lithium battery comprising:
2 an anode including a lithium-containing anode active material;
3 a cathode;
4 a separator between the anode and the cathode; and
5 a positive lead including aluminum in contact with a portion of the cathode.
- 1 2. The battery of claim 1, wherein the lithium-containing anode active material is
2 lithium or a lithium alloy.
- 1 3. The battery of claim 1, wherein the positive lead includes a 1000 series
2 aluminum, 2000 series aluminum alloy, a 3000 series aluminum alloy, a 5000 series
3 aluminum alloy, a 6000 series aluminum alloy, or a 7000 series aluminum alloy.
- 1 4. The battery of claim 1, wherein the positive lead includes a 5000 series
2 aluminum alloy.
- 1 5. The battery of claim 1, wherein the positive lead includes an aluminum alloy
2 including 0-0.4% by weight of chromium.
- 1 6. The battery of claim 1, wherein the positive lead includes an aluminum alloy
2 including 0.01-6.8% by weight of copper.
- 1 7. The battery of claim 1, wherein the positive lead includes an aluminum alloy
2 including 0.05-1.3% by weight of iron.
- 1 8. The battery of claim 1, wherein the positive lead includes an aluminum alloy
2 including 0.1-7% by weight of magnesium.
- 1 9. The battery of claim 1, wherein the positive lead includes an aluminum alloy
2 including 0-2% by weight of manganese.
- 1 10. The battery of claim 1, wherein the positive lead includes an aluminum alloy
2 including 0-2% by weight of silicon.

1 11. The battery of claim 1, wherein the positive lead includes an aluminum alloy
2 including less than 0.25% by weight of titanium.

1 12. The battery of claim 1, wherein the positive lead includes an aluminum alloy
2 including 0-2.3% by weight of nickel,.

1 13. The battery of claim 1, wherein the positive lead includes an aluminum alloy
2 including 0-8.2% by weight of zinc.

1 14. The battery of claim 1, wherein the cathode includes a current collector
2 including aluminum.

1 15. The battery of claim 14, wherein the current collector includes a 1000 series
2 aluminum, a 2000 series aluminum alloy, a 3000 series aluminum alloy, a 5000 series
3 aluminum alloy, a 6000 series aluminum alloy, or a 7000 series aluminum alloy.

1 16. The battery of claim 14, wherein the current collector includes a 6000 series
2 aluminum alloy.

1 17. The battery of claim 14, wherein the current collector includes an aluminum
2 alloy including 0-0.4% by weight of chromium, 0.01-6.8% by weight of copper, 0.05-1.3%
3 by weight of iron, 0.1-7% by weight of magnesium, 0-2% by weight of manganese, 0-2% by
4 weight of silicon, less than 0.25% by weight of titanium, 0-2.3% by weight of nickel, and 0-
5 8.2% by weight of zinc.

1 18. The battery of claim 1, wherein the positive lead includes an extension
2 directed toward the cathode.

1 19. The battery of claim 1, wherein the positive lead includes four or more
2 extensions directed toward the cathode.

1 20. The battery of claim 1, wherein the positive lead includes six or more
2 extensions directed toward the cathode.

1 21. The battery of claim 1, further comprising a nonaqueous electrolyte in contact
2 with the anode, the cathode and the separator.

1 22. The battery of claim 21, wherein the nonaqueous electrolyte includes an
2 organic solvent.

1 23. The battery of claim 21, wherein the nonaqueous electrolyte includes a
2 perchlorate salt.

1 24. The battery of claim 1, wherein the cathode includes a manganese dioxide,
2 iron disulfide, a CF_x, or a vanadate.

1 25. The battery of claim 1, wherein the battery is a cylindrical battery.

1 26. The battery of claim 1, wherein the battery has an impedance of less than
2 0.150 Ohms.

1 27. The battery of claim 1, wherein the battery has an impedance of less than
2 0.130 Ohms.

1 28. The battery of claim 1, wherein the battery has an impedance that increases by
2 less than 0.20 Ohms after the battery is dropped six times from a height of one meter onto a
3 hard surface.

1 29. The battery of claim 1, wherein the positive lead is welded to a portion of the
2 cathode.

1 30. A primary lithium battery comprising:
2 an anode including a lithium-containing anode active material;
3 a cathode including a current collector including aluminum;
4 a separator between the anode and the cathode; and
5 a positive lead including aluminum in contact with the cathode.

1 31. The battery of claim 30, wherein the current collector and the positive lead
2 each independently include a 1000 series aluminum, a 2000 series aluminum alloy, a 3000
3 series aluminum alloy, a 5000 series aluminum alloy, a 6000 series aluminum alloy, or a 7000
4 series aluminum alloy.

1 32. The battery of claim 30, wherein the current collector includes 6000 series
2 aluminum alloy and the positive lead includes a 5000 series aluminum alloy.

1 33. The battery of claim 30, wherein the current collector and the positive lead
2 each include an aluminum alloy including 0-0.4% by weight of chromium, 0.01-6.8% by
3 weight of copper, 0.05-1.3% by weight of iron, 0.1-7% by weight of magnesium, 0-2% by
4 weight of manganese, 0-2% by weight of silicon, less than 0.25% by weight of titanium, 0-
5 2.3% by weight of nickel, and 0-8.2% by weight of zinc.

1 34. The battery of claim 30, wherein the positive lead includes an extension
2 directed toward the cathode.

1 35. The battery of claim 30, wherein the positive lead includes four or more
2 extensions directed toward the cathode.

1 36. The battery of claim 30, wherein the positive lead includes six or more
2 extensions directed toward the cathode.

1 37. A method of making a primary lithium battery comprising:
2 placing a cathode in a housing; and
3 contacting the cathode with a positive lead including aluminum.

1 38. The method of claim 37, wherein the positive lead includes a 1000 series
2 aluminum, a 2000 series aluminum alloy, a 3000 series aluminum alloy, a 5000 series
3 aluminum alloy, a 6000 series aluminum alloy, or a 7000 series aluminum alloy.

1 39. The method of claim 37, wherein the positive lead includes a 5000 series
2 aluminum alloy.

1 40. The method of claim 37, wherein the positive lead includes an aluminum alloy
2 including 0-0.4% by weight of chromium, 0.01-6.8% by weight of copper, 0.05-1.3% by
3 weight of iron, 0.1-7% by weight of magnesium, 0-2% by weight of manganese, 0-2% by
4 weight of silicon, less than 0.25% by weight of titanium, 0-2.3% by weight of nickel, and 0-
5 8.2% by weight of zinc.

1 41. The method of claim 37, wherein the cathode includes a current collector
2 including aluminum.

1 42. The method of claim 41, wherein the current collector includes a 1000 series
2 aluminum, a 2000 series aluminum alloy, a 3000 series aluminum alloy, a 5000 series
3 aluminum alloy, a 6000 series aluminum alloy, or a 7000 series aluminum alloy.

1 43. The method of claim 41, wherein the positive lead and the current collector
2 each independently include a 1000 series aluminum, a 2000 series aluminum alloy, a 3000
3 series aluminum alloy, a 5000 series aluminum alloy, a 6000 series aluminum alloy, or a 7000
4 series aluminum alloy.

1 44. The method of claim 43, wherein the current collector includes a 6000 series
2 aluminum alloy.

1 45. The method of claim 37, wherein the housing is a cylindrical housing.

1 46. The method of claim 37, wherein the positive lead includes an extension
2 directed toward the cathode.

1 47. The method of claim 37, wherein the positive lead includes four or more
2 extensions directed toward the cathode.

1 48. The method of claim 37, wherein the positive lead includes six or more
2 extensions directed toward the cathode.

1 49. The method of claim 37, wherein the cathode includes a manganese dioxide,
2 iron disulfide, a CF_x , or a vanadate.

1 50. The method of claim 37, further comprising placing a nonaqueous electrolyte
2 in the housing.

1 51. The method of claim 50, wherein the nonaqueous electrolyte includes an
2 organic solvent.

1 52. The method of claim 51, wherein the nonaqueous electrolyte includes a
2 perchlorate salt.

1 53. The method of claim 38, wherein contacting includes welding.